

Fatal Mishap Resulting from a Pressure System Operation in Government Laboratory

**Leadership ViTS Meeting
April 3, 2006**

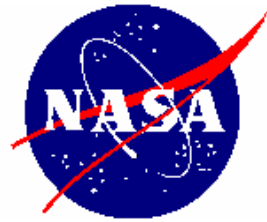
**Jim Lloyd
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The Accident

- Early this year a pressure system failed during initial use in a government laboratory
- One worker killed
- Significant programmatic disruptions
- Possible personal legal consequences



This is a vessel that is similar in construction/size to the one involved in the accident
-- stainless steel and approximately 20 inches in diameter



History leading to event

- The lab had need to calibrate transducers under pressure.
- To save money, a used vessel was selected
 - “it was here when we took over the facility in 1973”
- Unknowns:
 - vessel pressure rating
 - vessel quality
 - prior vessel application
- Nonetheless, the pressure vessel was integrated as part of the calibration system and put into service
- During initial pressurization the cover separated with great force from the body of the vessel, killing one worker.

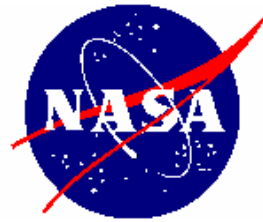


Vessel Information Developed during Accident Investigation

- Vessel at least 33 years old
- Unknown prior service, no nameplate, no drawings
- No pressure or temperature rating information
- Most welds on hold down bolts were cracked before being put into this service.
- A query near-completion of the mishap review by the government investigation board chairman identified the vessel as a vacuum chamber, and never intended for positive pressure

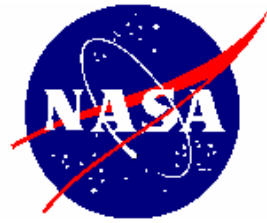
The Pressure Vessel





Proximate Causes (Pre-decisional)

- **Vessel design inappropriate for intended service**
 - Vacuum vessel put into service as a pressure vessel
- **Vessel not pressure checked prior to full use**
 - And no restricted access during initial pressurization
- **Critical welds on hold down bolts not inspected after 33+ years of existence**
 - Were not considered critical for a negative pressure (vacuum) application
- **Bolt welds were cracked and cracks exhibited corrosion prior to this use**
- **Vessel failed (chamber lid separated from chamber body) when all hold down bolt welds broke simultaneously.**



Lessons for NASA

- Only re-use equipment within known capabilities.
- Beware of fabricated systems bypassing the normal review process.
- Seek expert technical counsel when dealing with hazards resulting from potential energies like pressure.
- Inadequate (or non-existent) safety and engineering review procedures can lead to accidents, particularly in systems with significant stored energy.